

| REPORT DOCUMENTATION PAGE | | | | Form Approved OMB No. 0704-0188 | |
|--|-------------|----------------------------|-------------------------------|--|---|
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| 1. REPORT DATE (DD-MM-YYYY) 10/13/2017 | | 2. REPORT TYPE Abstract | | 3. DATES COVERED (From - To) 10/13/2017-10/18/2017 | |
| 4. TITLE AND SUBTITLE Acute Liver Failure in a Deployed Soldier | | | | 5a. CONTRACT NUMBER | |
| | | | | 5b. GRANT NUMBER | |
| | | | | 5c. PROGRAM ELEMENT NUMBER | |
| 6. AUTHOR(S) Lt Col John Gancayco | | | | 5d. PROJECT NUMBER | |
| | | | | 5e. TASK NUMBER | |
| | | | | 5f. WORK UNIT NUMBER | |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) 59th Clinical Research Division 1100 Willford Hall Loop, Bldg 4430 JBSA-Lackland, TX 78236-9908 210-292-7141 | | | | 8. PERFORMING ORGANIZATION REPORT NUMBER 17349 | |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) 59th Clinical Research Division 1100 Willford Hall Loop, Bldg 4430 JBSA-Lackland, TX 78236-9908 210-292-7141 | | | | 10. SPONSOR/MONITOR'S ACRONYM(S) | |
| | | | | 11. SPONSOR/MONITOR'S REPORT NUMBER(S) | |
| 12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release. Distribution is unlimited. | | | | | |
| 13. SUPPLEMENTARY NOTES | | | | | |
| 14. ABSTRACT | | | | | |
| 15. SUBJECT TERMS | | | | | |
| 16. SECURITY CLASSIFICATION OF: | | | 17. LIMITATION OF ABSTRACT | 18. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON |
| a. REPORT | b. ABSTRACT | c. THIS PAGE | | | Clarice Longoria |
| | | | | | 19b. TELEPHONE NUMBER (Include area code) 210-292-7141 |

| Exhibit | Brand | Indicated Components |
|---------|----------------|-----------------------------------|
| 1 | Pulse (Legion) | Betaine Hydrochloride |
| | | N,N-Dimethylglycine |
| | | Fumaric Acid |
| | | N-Maleoyl-beta-alanine |
| | | Caffeine |
| | | n-Hexadecanoic acid |
| | | tetramethyl-ethyl ester, L-Lysine |
| | | Desoxy-isosteviol methyl ester |
| | | Methyl Steviol |
| | | Hydroxydehydrostevic acid |

| | | |
|---|--------------|---|
| 2 | Spark Energy | Vitamin E Acetate |
| | | Pantolactone |
| | | 3-methyl-4-propyl-2,5-Furandione |
| | | 5-hydroxymethylfurfural |
| | | 4-methyl-5-thiazoleethanol |
| | | Caffeine |
| | | n-Hexadecanoic acid |
| | | Glycerol tricaprylate |
| | | 2-(Decanoyloxy)propane-1,3-diyl dioctanoate |
| | | Tyrosine |

| | | |
|---|-----------|------------------------|
| 3 | No Xplode | Pantolactone |
| | | Niacin |
| | | N-Maleoyl-beta-alanine |
| | | Caffeine |
| | | N-Formyl-L-tyrosine |

| | | |
|---|------------|---|
| 4 | Dr. Jekyll | 2-hydroxy-1-(hydroxymethyl)ethyl ester hexadecanoic acid |
| | | 2-hydroxy-1-(hydroxymethyl)ethyl ester octadecanoic acid |
| | | 2-hydroxy-1-(hydroxymethyl)ethyl ester tetradecanoic acid |
| | | Niacin |
| | | 2-ethenyl-4-methyl-1,3-dioxolane |
| | | Leucine |
| | | Caffeine |
| | | Palmitic Acid |
| | | Stearic Acid |

| | | |
|---|----------|----------------------------------|
| 5 | Mr. Hyde | 2-ethenyl-4-methyl-1,3-dioxolane |
|---|----------|----------------------------------|

| | | |
|---|----|----------------|
| 6 | C4 | Ethyl Vanillin |
| | | Caffeine |

| | | |
|---|--------------|----------------|
| 7 | Amino Energy | Ethyl Vanillin |
| | | Caffeine |
| | | Palmitic Acid |

| | | |
|---|------------|--|
| 8 | Hydroxycut | 5,6,6-trimethyl-5-(3-oxobut-1-enyl)-1-oxaspiro[2.5]octan-4-one |
| | | Yohimbine |
| | | 3,4-Dimethyl-3-pyrrolin-2-one |
| | | Hydroquinone |
| | | p-fluorophenyl ester butyric acid |
| | | Caffeine |
| | | Palmitic Acid |
| | | Stearic Acid |
| | | 3-(1-Methylhept-1-enyl)-5-methyl-2,5-dihydrofuran-2-one |
| | | 4-(3-hydroxy-6,6-dimethyl-2-methylenecyclohexyl)-3-Buten-2-one |

Acute liver injury in deployed soldier.

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Introduction: Supplements can be a dangerous source of casualties in the deployed setting. This case describes an incidence of acute hepatic injury induced by Hydroxycut. Supplements, like Hydroxycut, are non-regulated and often proprietary blends leading those taking them unaware of potential risk. Following this case, the Afghanistan Captured Material Exploitation (ACME) lab at Bagram conducted chemical analysis of several supplements used by soldiers to investigate the potential threat.

Case:

The patient is a 22-year-old, deployed male. He was exercising on a regular basis in an attempt to lose weight and began taking Hydroxycut 6 days prior to his presentation to the hospital. On presentation he had complaints of muscle aches and malaise. His initial labs were remarkable for a CK of 6720, AST of 111U/L, ALT 62 U/L, INR 1.9; his other labs to include a toxicology screen, hepatitis panel, and acetaminophen level were normal. His AST and ALT peaked at values of 611 and 938 respectively before down trending. He was monitored in the hospital for 3 days prior to down trending and then followed up 1 week later with noted normalization of his labs except his AST and ALT which were 346 and 718 respectively, his INR was less than 0.8.

Discussion: This case is an example of supplement-induced acute liver injury. Supplements are notorious for their minimal regulation by the Food and Drug Administration (FDA). While the FDA does regulate to ensure that products are not adulterated or misbranded, safety is left to the manufacturers which results in potential dangers to patients.¹ Unfortunately, this supplement has been linked to the same condition before and a health advisory was issued in 2009 in connection to hepatitis; the supplement was briefly removed from the market and a new formulation was released, but toxicity continues to be reported.²⁻³ Since manufacturers call their product ingredients proprietary, individuals are left not knowing the makeup of the supplements they take. In the attached charts are the ingredients that the ACME lab in Bagram found to be in common supplements used by deployed soldiers.

References:

1. "Dietary Supplements." www.fda.gov. Jan 26, 2017.
2. Warning on Hydroxycut Products. FDA Consumer Health Information 2009. U.S. Food and Drug Administration.
3. Araujo J, Worman H. Acute liver injury associated with a newer formulation of the herbal weight loss supplement Hydroxycut. BMJ Case Rep 2015. Online Publication.

Note: The views expressed are those of Dr. Brazeau and Dr. Gancayco and do not reflect the official views or policy of the Department of Defense or its components.